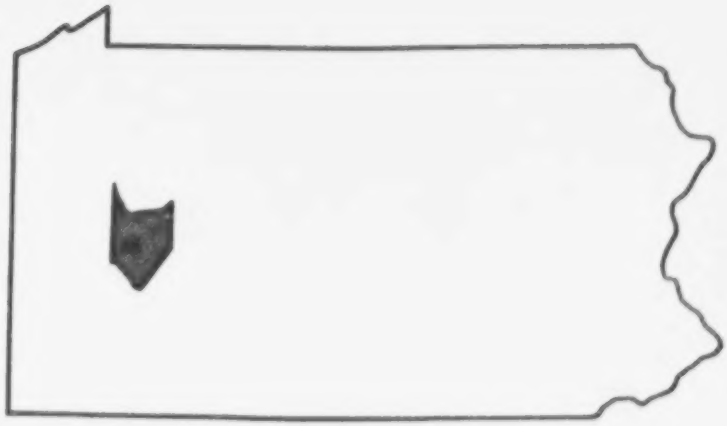
JAN 16 1988

FLOOD INSURANCE STUDY

TOWNSHIP OF EAST FRANKLIN, PENNSYLVANIA
ARMSTRONG COUNTY



APRIL 5, 1988

Federal Emergency Management Agency

COMMUNITY NUMBER - 421305

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) have established repositories of flood hazard data for floodplain management and flood insurance study purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY
TOWNSHIP OF EAST FRANKLIN, ARMSTRONG COUNTY, PENNSYLVANIA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Township of East Franklin, Armstrong County, Pennsylvania, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were prepared using a Flood Plain Information report on the Allegheny River and the Flood Insurance Study for the Borough of Kittanning. These studies were prepared by the Pittsburgh District of the U. S. Army Corps of Engineers (COE).

1.3 Coordination

On December 19, 1986, the Township of East Franklin was notified by the Federal Emergency Management Agency (FEMA) of the initiation of a Flood Insurance Study for the community.

On April 27, 1987, a final CCO meeting was held with representatives of FEMA and the township to review the results of the study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Township of East Franklin, Armstrong County, Pennsylvania. The

Boroughs of West Kittannning and Applewold, which lie within the corporate limits of East Franklin, are not included in this study. The area of study is shown on the Vicinity Map (Figure 1).

The Allegheny River was studied by detailed methods for its entire length within the community. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction.

Glade Run, Long Run, Limestone Run and several unnamed tributaries were studied by approximate methods. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards.

2.2 Community Description

The Township of East Franklin is located in the northern portion of Armstrong County along the western bank of the Allegheny River. It is bordered by the Townships of Boggs, Rayburn, and Manor to the east; the Townships of Washington and Sugarcreek to the north; the Township of West Franklin to the west; and the Township of North Buffalo to the south.

The Allegheny River basin has a drainage area of 11,778 square miles. This basin lies between the headwaters in the western slope of the Appalachian Mountain Range in the northwestern part of Pennsylvania and its confluence with the Monongahela and Ohio Rivers in the City of Pittsburgh. The Allegheny River flows for a total distance of 322 miles, flowing generally northwest to Salamanca, New York; southwest to Franklin, Pennsylvania; southeast to the mouth of Mahoning Creek; and southwest to Pittsburgh, Pennsylvania. Throughout the township, the river flows generally southward.

The climate for the area is temperate with normal seasonal variations in temperature. Armstrong County is geographically located in a region of both polar and tropical air mass activity, subjected to continental and maritime invasion. The weather is usually moderate but may have occasional rapid changes resulting from frontal air mass movements. Temperatures seldom exceed 90 degrees Fahrenheit (^{o}F) in midsummer or dip below 0^{o} in the winter months. Measurable precipitation occurs on an average of 149 days a year and amount to an annual average of 42 inches. The average snowfall is 40 inches per year, and a snow cover of 1 inch or more can be found during at least 80 days per year. Of this measurable precipitation, approximately 58 percent is lost through evaporation, transpiration, and infiltration; less than 2 inches or 10 percent of the available water is used; and the remaining water moves into streams as runoff.

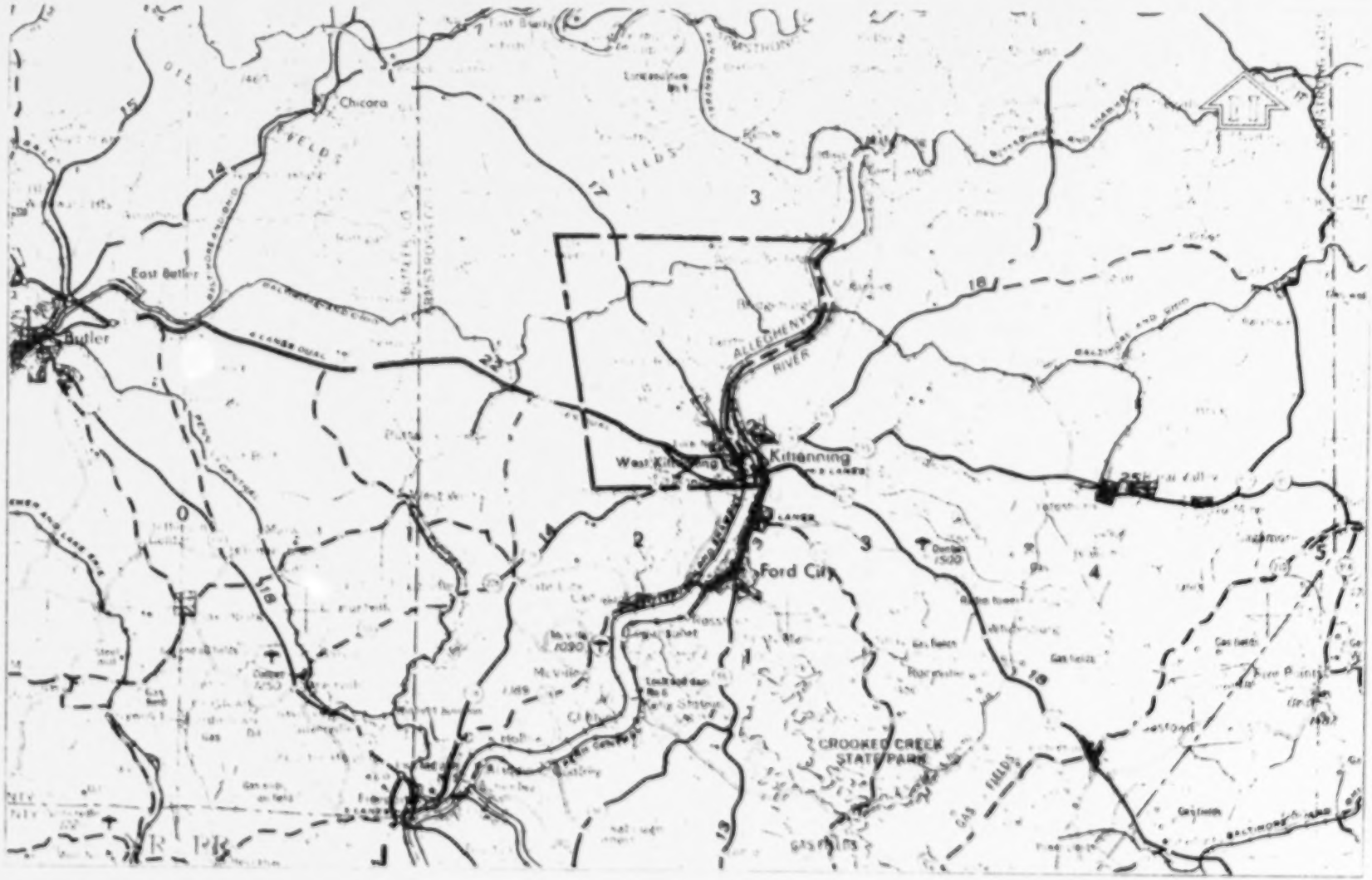


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF EAST FRANKLIN, PA

(ARMSTRONG CO.)

APPROXIMATE SCALE

4 0 4 8 12 MILES

VICINITY MAP

2.3 Principal Flood Problems

Major floods have occurred on the Allegheny River at various times of the year; however, the main flood season is usually December through April. Most of the floods during this period are the result of heavy rain and snowmelt. It is possible for large floods with a duration of several days to occur at any time of the year. Although summer floods are rare on the Allegheny River, the flood of June 1972 was of considerable magnitude in spite of the reduction by the upstream control dams and reservoirs.

The maximum flood of record on the Allegheny River upstream of Lock and Dam No. 7 in Kittanning occurred in March 1913. Ice gorges caused even higher crest elevations in January 1959. Downstream of Lock and Dam No. 7, the maximum flood of record occurred in March 1939. The following tabulation shows major floods of record on the Allegheny River as measured at the U. S. Geological Survey (USGS) gage at Lock and Dam No. 7 in Kittanning:

Date of Crest	Stage In Feet	Elevation In Feet	Discharge (cfs)
March 26, 1913	30.7	802.0	270,000
March 18, 1865	29.6	800.9	252,000
March 20, 1905*	28.8	800.1	245,000
March 10, 1964*	26.6	797.9	213,800
March 13, 1920*	26.4	797.7	206,000
January 22, 1959*	26.3	797.6	207,700
March 18, 1936*	26.0	797.3	201,900
December 30, 1942*	25.5	796.8	192,000
June 23, 1972*	25.5	796.8	189,300
March 5, 1964*	25.2	796.5	186,200
February 16, 1908	24.8	796.1	184,000

*Includes full or partial reduction from flood control projects

2.4 Flood Protection Measures

There are five dams on the Allegheny River in Armstrong County, but these are not gated and have no flood control capacity. They are fixed-crest structures designed to maintain normal pool elevations during low water. Nine upstream flood control dams and reservoirs, built, operated, and maintained by the COE, act to reduce flood levels on the Allegheny River within Armstrong County. Flows impounded by this system of reservoirs reduce major flood crests by 4 to 10 feet. During the flood of June 1972, these reservoirs reduced the flood crest at Kittanning by 5.1 feet. This prevented a flood crest 4.6 feet higher than the March 1936 flood.

A river forecasting service for the entire Pittsburgh District is provided by the National Weather Service of the National Oceanic and Atmospheric Administration (NOAA). Approximately 50 daily reports of river levels and precipitation amounts from a network of observers established by the National Weather Service and the COE are used in preparing general river forecasts. In 1955, the Commonwealth of Pennsylvania established an efficient Civil Defense Organization on a statewide basis for the dissemination of flood warnings. The Armstrong County Civil Defense Organization has an established Standard Operational Procedure (SOP) that describes specifically the measures and actions to be instigated during flood emergencies. The Office of Civil Defense directs and coordinates all flood disaster operations from the Civil Defense Emergency Operating Center. Assisting organizations, such as the Red Cross, State Troopers, Salvation Army, and National Guard are alerted and utilized as necessary. Close liaison is maintained by the Director of Civil Defense with the COE and weather forecasting personnel before, during, and following all flood emergencies.

Ice gorge development, historically a problem along the Allegheny River, has caused major flood crest elevations from relatively minor flood flows. In addition, large flood flows have coincided with ice gorges causing even higher flood crest elevations. A major flood in this reach occurs when the river stage at Parker exceeds 20.0 feet. The maximum recorded flood level at Parker resulted from heavy rain and snowmelt coincident with ice jamming in January 1959. The maximum flood flow during the period of record occurred in March 1913, which was 1.2 times larger than that of January 1959; however, the March 1913 flood crested 2.4 feet below the January 1959 level. The historical flood of March 1865 is known to have exceeded the March 1913 flood level, with an estimated flood flow approximately 1.4 times that of January 1959; however, the March 1865 flood crested an estimated 0.2 foot below the January 1959 flood crest.

3.0 ENGINEERING METHODS

For the flooding source studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year

flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for the flooding source studied in detail affecting the community.

The hydrologic analyses for the Allegheny River was taken from the COE Flood Plain Information report and the Flood Insurance Study for the Borough of Kittanning (References 1 and 2). In those reports, flood flows for the Allegheny River were developed following the standard log-Pearson Type III analysis of stage-discharge records using methods outlined by Water Resources Council Bulletin 17 (Reference 3). The stage-discharge records used in the analysis of the Allegheny River were obtained at Lock and Dam No. 7 at Kittanning with 55 years of record. A staff gage located on the upper lock wall at Lock and Dam No. 7 has been maintained by the COE since January 1931. In 1939, the USGS installed a recording gage on the upstream lock wall. Prior to 1931, a nonrecording gaged was maintained downstream of Lock and Dam No. 7. Records were also used from USGS gage No. 03031500 (with 54 years of record), located on the right bank of the Allegheny River approximately 500 feet downstream from the State Route 368 bridge upstream of the Township of East Franklin. To supplement the gaging station records, newspaper files, historical documents, and records were searched. Additional high-water mark data, obtained by field observations and interviews with local residents, were referenced to bench mark elevations above mean sea level.

A summary of the drainage area-peak discharge relationships for the Allegheny River is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
ALLEGHENY RIVER					
At Lock and Dam No. 7	8,982	152,000	196,000	215,500	261,000

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the source studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

The hydraulic analysis for the Allegheny River was taken from the COE Flood Plain Information report on the Allegheny River and the Flood Insurance Study for the Borough of Kittanning (References 1 and 2). Mapping used in the presentation of those reports is based on USGS topographic maps at a scale of 1:24,000 with a contour interval of 20 feet (Reference 4).

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the Flood Insurance Rate Map (Exhibit 2).

Water-surface elevations of floods of the selected recurrence intervals were computed using the COE HEC-2 step-backwater computer program (Reference 5). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals. Starting water-surface elevations for the Allegheny River were based on stage-discharge relationships at the downstream corporate limits that were obtained by a continuation of profile computations starting at the Allegheny River in Pittsburgh, Pennsylvania.

Roughness coefficients (Manning's "n") for the Allegheny River were chosen on the basis of field inspection and verification of roughness requirements to reproduce profiles for known floods for which high-water marks were obtained and flow quantities were measured or easily calculated. For the Allegheny River, the channel "n" value was 0.028, and the overbank "n" values ranged from 0.050 to 0.080. The well-defined flood of June 1972 and moderate flow of October 1954 were reproduced successfully using these channel and overbank "n" values.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For the stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24,000 with a contour interval of 20 feet (Reference 4).

For the streams studied by approximate methods, the boundary of the 100-year flood has been delineated using the Flood Hazard Boundary Map for the Township of East Franklin (Reference 6).

The 100- and 500-year floodplain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE), and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

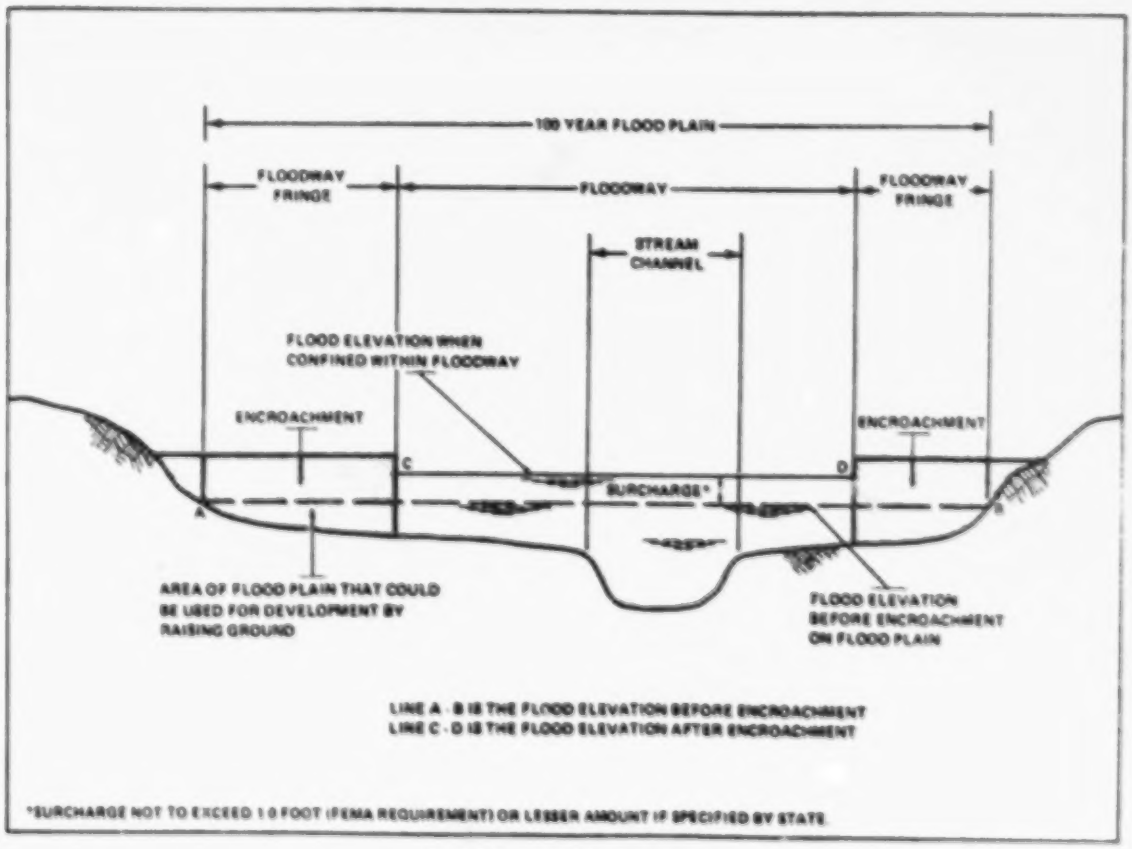
For the streams studied by approximate methods, only the 100-year floodplain boundary is shown on the Flood Insurance Rate Map (Exhibit 2).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood- carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodway in this study is presented to local agencies as a minimum standard that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodway presented in this study was computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table 2). The computed floodway is shown on the Flood Insurance Rate Map (Exhibit 2). In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodway widths for the Allegheny River extend beyond the corporate limits.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FLOODWAY SCHEMATIC Figure 2

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Allegheny River								
A	44.86	890	27,758	7.8	793.8	793.8	794.5	0.7
B	46.00	1,392	39,260	5.5	799.1	799.1	799.3	0.2
C	46.55	828	26,883	8.0	799.2	799.2	799.4	0.2
D	47.20	990	30,833	7.0	800.0	800.0	800.3	0.3
E	48.00	1,035	30,808	7.0	801.0	801.0	801.1	0.1

[1]Miles above confluence with Ohio River

[2]This width extends beyond corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF EAST FRANKLIN, PA
(ARMSTRONG CO.)

FLOODWAY DATA

ALLEGHENY RIVER

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the detailed hydraulic analyses are shown within this zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 100-year floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are

Zone V - continued

performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 100-year coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, and to areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year floodplains. Floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable.

7.0 OTHER STUDIES

A Flood Insurance Study has been prepared for the Borough of Kittanning (Reference 2). The results of this study are in exact agreement with the results of that study.

Flood Insurance Studies are currently being prepared for the Borough of Applewold and the Township of Washington (References 7 and 8). The results of those studies will be in complete agreement with the results of this study.

Due to its more detailed nature, this study supersedes the Flood Hazard Boundary Map for the Township of East Franklin (Reference 6).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA, the Natural and Technological Hazards Division, Liberty Square Building (Second Floor), 105 South Seventh Street, Philadelphia, Pennsylvania 19106.

9.0 BIBLIOGRAPHY AND REFERENCES

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3. Water Resources Council, "Guidelines for Determining Flood Flow Frequency," Bulletin 17, Washington, D. C., March 1976.

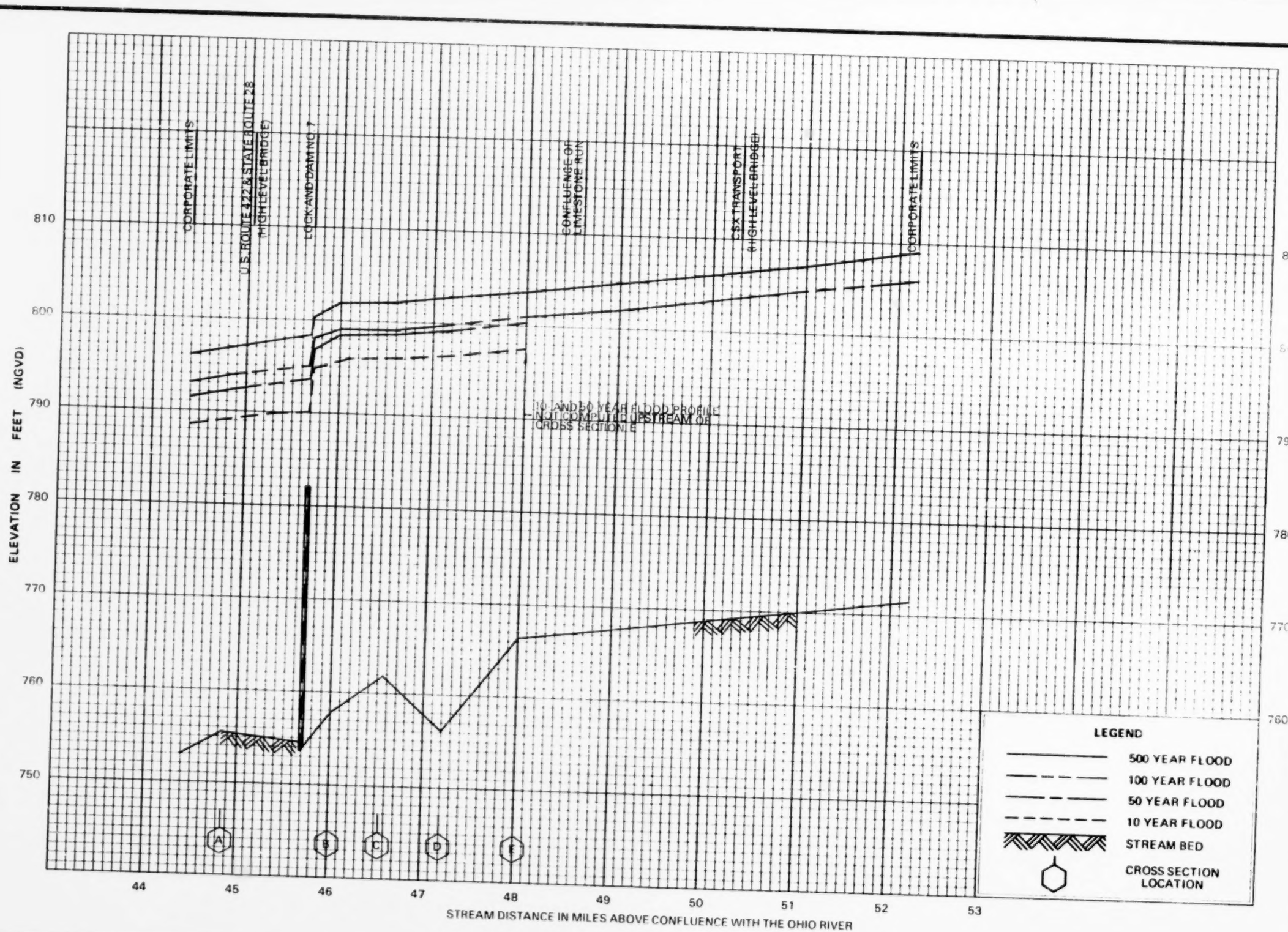
4. U. S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 20 Feet: Templeton,Pennsylvania, 1969, Photorevised 1979; East Brady, Pennsylvania, 1963, Photorevised 1972; Kittanning, Pennsylvania, 1968, Photorevised 1979; Mosgrove, Pennsylvania, 1968, Photorevised 1979.

5. U. S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Users Manual, Davis, California, December 1978 with updates.

6. U. S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Township of East Franklin, Armstrong County, Pennsylvania, December 6, 1974.

7. Federal Emergency Management Agency, Flood Insurance Study, Borough of Applewold, Armstrong County, Pennsylvania (Unpublished).

8. Federal Emergency Management Agency, Flood Insurance Study, Township of Washington, Armstrong County, Pennsylvania (Unpublished).



FLOOD PROFILES

ALLEGHENY RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWNSHIP OF EAST FRANKLIN, PA

(ARMSTRONG CO.)

01P